ASTRONOMICAL OBSERVATIONS IN 1908.

MADE BY TORVALD KÖHL, AT ODDER, DENMARK.

VARIABLE STARS.

(The instrument used is a 3-inch Steinheil, power 42.)

S *Ursæ Majoris.*[1]

Jan. 2: S $\begin{cases} > \text{e.} \\ < \text{d.} \end{cases}$

  4: id.
  5: < d.
 10: 1 step < d.
 13: = d.
 14: id.
 18: id.
 20: id.
 21: id.
 28: id.
 29: id.
 31: id.
Feb. 2: 1 step > d.
  6: 2 steps > d.
  8: id.
 10: id.
 16: id.
 19: $\begin{cases} \text{in the midst} \\ \text{between d and c.} \end{cases}$
 23: 2½ steps > d.
 29: $\begin{cases} \text{in the midst} \\ \text{between d and e.} \end{cases}$
Mar. 23: 1 step > e.
 24: = e.
 25: 1 step < e.
 26: id.
 27: id.
 28: 2 steps < e.
 29: id.
 30: 3 steps < e.
Apr. 1: 4 steps < e.
  2: 3 steps > f.
  3: id.
  6: id.
  7: id.

Apr. 8: id.
 19: 1 step > f.
May 1: = f.
 11: = g.
 18: $\begin{cases} < \text{g.} \\ > \text{h.} \end{cases}$
 20: id.
Aug. 14: 1 step > d.
 17: 2 steps > d.
 23: id.
 24: id.
 27: id.
 29: 1 step > d.
 31: 2½ steps > d.
Sept. 3: 3 steps > d.
  9: id.
 16: 5 steps > d.
 19: 6 steps < c.
 22: 5 steps < c.
 24: id.
 25: id.
 30: 5 steps > d.
Oct. 3: id.
  5: id.
 10: 4 steps > d.
 18: 1 step < d.
 22: 2 steps > d.
Nov. 1: = e.
  6: id.
  8: id.
 16: $\begin{cases} \text{in the midst} \\ \text{between e and f'.} \end{cases}$
 26: 2 steps > f.
 29: $\begin{cases} < \text{f.} \\ > \text{g.} \end{cases}$

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[1] Vide the sketch in the *Publications A. S. P.*, No. 73, **12**, 56.

T *Ursæ Majoris.*[1]

Jan. 2: T 5 steps > a.
    4: 4 steps > a.
    5: id.
  10: 2 steps > a.
  13: 1 step > a.
  14: id.
  18: 2 steps > a.
  20: 1½ step > a.
  21: 2 steps > a.
  28: 1 step < a.
  29: id.
  31: id.
Feb. 2: 2 steps < a.
  6: $\begin{cases} < b. \\ > c. \end{cases}$
  8: 1 step < b.
  9: id.
  10: 2 steps > c.
  16: id.
  19: $\begin{cases} \text{in the midst} \\ \text{between c and d.} \end{cases}$
  23: 1½ step > d.
  29: $\begin{cases} \text{in the midst} \\ \text{between d and e.} \end{cases}$
Mar. 18: < e.
  23: = f.
  24: $\begin{cases} < f. \\ > g. \end{cases}$
  25: id.
  26: 1 step > g.
  27: = g.
  28: id.
  29: 1 step < g.
  30: id.
Apr. 1: very faint.
  2: id.
  3: id.
  6: id.
  7: id.

Apr. 8: invisible.
  15: id.
  16: id.
  19: id.
  20: id.
May 11: id.
  18: id.
  20: id.
Aug. 14: $\begin{cases} < b. \\ > c. \end{cases}$
  17: 1 step > b.
  23: $\begin{cases} < a. \\ 2 \text{ steps} > b. \end{cases}$
  24: $\begin{cases} < a. \\ > b. \end{cases}$
  27: 1 step > a.
  29: 2 steps > a.
  31: 1 step > a.
Sept. 3: 2 steps > a.
  9: 3 steps > a.
  16: id.
  19: 4 steps > a.
  22: id.
  24: id.
  25: id.
  30: = a.
Oct. 3: id.
  5: = b.
  10: id.
  18: = c.(?)
  22: $\begin{cases} < c. \\ > d. \end{cases}$
Nov. 1: 1 step < d.
  4: 3 steps > e.
  6: id.
  8: id.
  16: id.
  26: = g.
  29: = f = g.

The comparison stars f and g are found to be a little variable. August 24th, I have noted: g 1 step > f. On November 29th: f = g. Usually I note: f > g, the difference being only 1 step. B. D. has f = g = $9^m.5$; Harvard has f = $10^m.75$, g = $10^m.40$.

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[1] Vide the sketch in the *Publications A. S. P.,* No. 22, **4**, 63.

W *Pegasi.*[1]

Jan. 1 : W = b.

2 : { in the midst / between b and c.

4 : { < b. / > c.

5 : id.

14 : 1 step > c.

18 : = c.

20 : id.

21 : 1 step < c.

29 : 3 steps < c.

31 : 1 step > d.

Feb. 2 : 1½ step > d.

9 : 1 step > d.

19 : = e.

29 : { in the midst / between e and f.

Aug. 14 : { < g. / > h.

18 : = h.

23 : id.

Aug. 24 : id.

27 : { < g. / > h.

29 : id.

31 : id.

Sept. 3 : id.

4 : id.

12 : id.

16 : a little > h.

20 : { < g. / > h.

24 : = g.

25 : = f.

30 : id.

Oct. 3 : 1 step< f.

5 : id.

18 : 1 step < e.

Nov. 8 : 2 steps < c.

16 : 1 step < b.

26 : = b.

29 : id.

SS *Cygni.*[2]

Jan. 1, 6^h : SS = g.

2, 9^h : < g.

4, 6^h : = h.

5, 7^h : very faint.

14, 6^h : invisible.

18, 6^h : id.

20, 6^h : id.

21, 7^h : id.

29, 7^h : 1 step < b.

31, 7^h : = b.

Feb. 2, 7^h : { < b. / 2 steps > c.

6, 6^h : 2 steps > d.

9, 6^h : = e.

16, 7^h : invisible.

19, 7^h : very faint.

Apr. 20, 12^h : invisible.

21, 10^h : id.

26, 11^h : id.

May 1, 11^h : 1 step < e.

9, 10^h : 1 step < c.

May 11, 11^h : { 3 steps >c. / 1 step< b.

15, 10^h : 1 step > c.

18, 11^h : 1 step < c.

20, 12^h : = d.

Aug. 14, 10^h : { > e. / < d.

15, 10^h : { in the midst / bet. d and e.

17, 11^h : < e.

18, 10^h : 4 steps < e.

23, 10^h : = f.

24, 10^h : { > f. / < e.

27, 10^h : 1 step > f.

29, 10^h : { > f. / < e.

31, 10^h : = e.

Sept. 3, 10^h : = e.

4, 9^h : { > f. / < e.

[1] Vide the sketch in the *Publications A. S. P.*, No. 60, **10, 23**.
[2] Vide the sketch in the *Publications A. S. P.*, No. 100, **17, 18**.

Sept. 9, 9^h: $= d.$
11, 8^h: 2 steps $< c.$
12, 8^h: $1\frac{1}{2}$ step $< c.$
16, 9^h: 2 steps $> c.$
19, 9^h: $\begin{cases} \text{in the midst} \\ \text{bet. b and c.} \end{cases}$
20, 8^h: $b(3)SS(2)c$
23, 8^h: $\begin{cases} < c. \\ > d. \end{cases}$
24, 10^h: $= d.$
25, 9^h: 2 steps $< d.$
30, 12^h: 4 steps $< d.$
Oct. 1, 10^h: id.
3, 9^h: $= e.$

Oct.   5, 8^h: $\begin{cases} < d'. \\ > e. \end{cases}$
18, 9^h: $d'(3)SS(2)e$
Nov. 1, 8^h: $\begin{cases} < d'. \\ > e. \end{cases}$
4, 8^h: $= e.$
6, 9^h: $= e(?).$
8, 7^h: $d'(3)SS(2)e$
14, 7^h: 2 steps $> c.$
16, 8^h: $= d.$
26, 6^h: $= e.$
29, 6^h: 1 step $> f.$

Z Cygni.[1]

Jan. 1: Z 2 steps $> a.$
2: 1 step $> a.$
4: $< a.$
5: $\begin{cases} < a. \\ > b. \end{cases}$
14: 1 step $> a.$
18: 2 steps $> a.$
20: 1 step $> a.$
21: id.
28: $= a.$
29: 2 steps $> a.$
31: 1 step $> a.$
Feb. 2: $= a.$
6: $= b.$
16: 2 steps $> b(?).$
19: $= b.$
Mar. 25: very faint.
Apr. 1: id.
20: invisible.
21: id.
26: very faint.
May 1: faint, $< e.$
9: invisible.
15: id.
18: id.
20: id.

Aug. 14: id.
18: id.
23: id.
Sept. 3: $= e.$
9: $\begin{cases} > e. \\ < d. \end{cases}$
11: $\begin{cases} > d. \\ < c. \end{cases}$
16: id.
19: $= d.$
22: $\begin{cases} > c. \\ < b. \end{cases}$
24: id.
30: $= b.$
Oct. 3: $= b'.$
5: id.
18: $\begin{cases} < a. \\ > b'. \end{cases}$
Nov. 1: $= b'.$
4: $= b.$
6: 1 step $> b.$
8: $1\frac{1}{2}$ step $< b.$
14: 1 step $< b.$
16: $\begin{cases} < b. \\ > c. \end{cases}$
29: $= d.$

Y *Tauri* (B. D. $+ 20°$ 1083).

A number of forty comparisons have been made upon this irregular variable star, which during the whole year was either

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[1] Vide the sketch in the *Publications A. S. P.*, No. 100, **17**, 16.

equal to or some steps brighter than the star A = B. D. + 20°. 1095 (7^m.4). In February, March, and April the star Y had reached its maximum (7^m.1), but in January and November it had decreased a few steps.

<div align="center">U Herculis.</div>

Apr. 20: U invisible(?).	Sept. 11: $\begin{cases} < c. \\ > d. \end{cases}$
26: 2 steps < h.	
May 1: id.	12: = c.
18: 1 step > h.	16: $\begin{cases} < c. \\ > d. \end{cases}$
20: id.	
Aug. 15: = a.	19: C(2)U(3)d.
17: $\begin{cases} > c \\ < a \end{cases}$ b> a.	22: id.
	23: $\begin{cases}$ in the midst $\\$ between c and d. $\end{cases}$
18: 2 steps < a.	
23: id.	24: id.
24: id.	25: C(3)U(2)d.
27: id.	30: id.
29: id.	Oct. 3: = d.
31: = c.	5: 2 steps> d.
Sept. 3: id.	10: 1 step > d.
4: 1 step > c.	18: = e.
9: ½ step > c.	Nov. 29: 2 steps < f.

I have used the sketch in the *Publications A. S. P.,* No. 106, **18,** 52, drawn by Miss ROSE O'HALLORAN, but have added the two small neighboring stars g at a and h at f, both northward.

<div align="center">

A SUSPECTED VARIABLE STAR.

138.1908 *Herculis.*

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During my observations upon U *Herculis* my attention was directed to the two comparison-stars,

$$a = \text{B. D.} + 19° 3096 \quad 7^m.0.$$
$$b = \text{B. D.} + 19° 3089 \quad 7^m.8.$$

The star b is here eight steps fainter than a. On August 5, 1907, I found b > a, and so I have seen it until October, 1908. On October 5th, 10th, and 18th, I have noted: b 2-3 steps < a. But when the ocular was screwed out the reddish star a was "diminished," and then seemed to be equal to or even dimmer than b. In A. G. Berlin A 5856 is

$$a = 7^m.2$$
$$b = 7^m.7,$$

and in *Harvard Annals,* **37,** 170 and 183, we find

$$a = 7^m.36$$
$$b = 7^m.39.$$

Whether the variable is a or b is still difficult to decide. According to its red color, it might perhaps be the star a, though a look at the differences might point out b as the variable one. It will be necessary to compare b with a and c. (Vide *Astronomische Nachrichten,* No. 4274, **179,** 29.)

METEORS.

Fireballs have been observed from stations in Denmark at the following dates: January 3d, 21st; March 2d, 16th, 25th; April 8th, 15th; May 1st, 11th, 29th; June 25th, 26th; July 2d, 20th, 21st; August 6th, 20th; October 7th, 24th; November 8th, 21st; December 3d, 7th.

SHOOTING-STARS.

A little swarm of shooting-stars, during five minutes more than thirty meteors, was observed on January 2d, $8^h 10^m$–$8^h 20^m$, at Hjörring, Denmark, radiant $= 300° + 61°$; and on January 3d, $11^h 23^m$–$12^h 42^m$, seventeen large shooting-stars were mapped at Paderborn, Germany. (Vide *Astronomische Rundschau,* No. 98, and *Astronomische Nachrichten,* No. 4263, **178,** 255.) On June 25th, $10^h 30^m$, an observer at Odense, Denmark, mapped a most interesting twin-meteor, two shooting-stars with parallel paths, with a distance of $\frac{1}{2}°$, one on each side of the pretty star *Arcturus.*

The weather was, in the year 1908, quite unfavorable for the planned observations on shooting-stars in August, and after November 29th the sky was overcast with clouds every night here at Odder.

The above-mentioned estimations of variable stars have often been controlled by my young assistant, JÖRGEN FOG.